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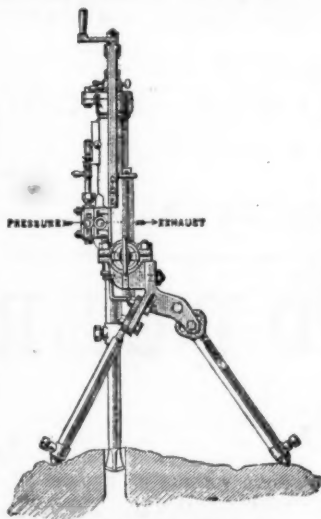
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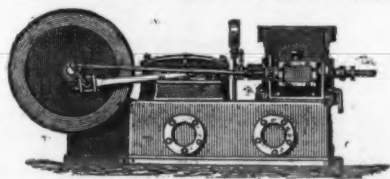


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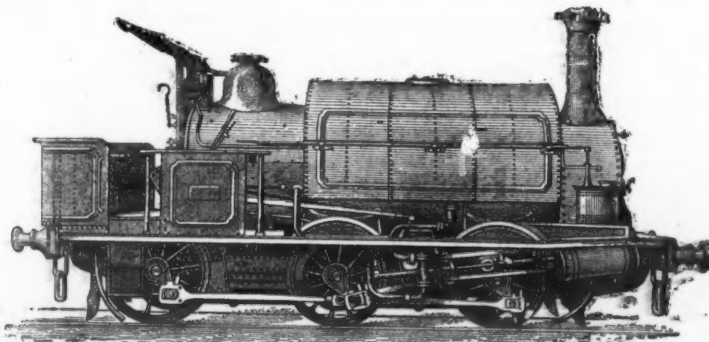
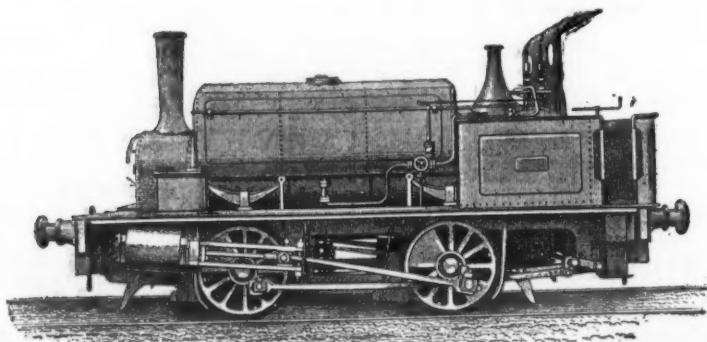
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Original Correspondence.

THE COMPLAINT OF A SCOTCH LAMP.

SIR,—I am a safety-lamp, a Scotch safety-lamp if you will, and I want to tell you my story. I am a good broad-bottomed lamp with a flat wick, and give a good honest light equal to two sperm candles. Over me is placed a gauze cylinder 9 in. long, $3\frac{1}{2}$ in. diameter, so as not to be heated too much. If I am put among gas I do not ignite the gas outside. This is all I claim. I have for the last 60 years been doing my best to light the miners in their daily toil, and to give them some small measure of protection; giving them a good light, and although I do not bounce, I say a better light than any of my colleagues; and, what is more, I never to my knowledge caused a man to be burned. In short, I have answered my purpose, and being of a modest nature have never advertised myself, nor had I ever travelled out of my small gin-round of the West of Scotland.

The spread of railways, the consequent distribution of the people in thirteenth or in quest of information, has brought to light many provincialisms, and among others myself, and very much to my annoyance and discomfort. I have been unceremoniously dragged before the court of public opinion as an impostor, as being employed under false pretences, and have had some difficulty in clearing myself of the imputation. At first it looked uncommon rough for me. "What does thou call that thing, Tom?" asked one gentleman holding me up by my hook. "I don't know," responded Tom. "Does thou call that thing a safety-lamp?" continued the questioner, holding me up that all the company might see me. "No!" roared Tom, and they both roared with laughter.

It seemed evident to me that he got the answer that he expected, for he put me down, and said that I was made quite against the rules of Sir Humphry Davy, and against all the laws of hydrostatics. I think he meant pneumatics, but seemed to have forgot. Another gentleman took me up, held me in both hands at arm's length, and gazed at me through very large eye-glasses, made faces at me, shrugged his shoulders at me in a solemn way, and then asked various questions about me, such as—What I did? where I lived? and what age I was? jerking out his sentences in a kind of solemn way, and continuing to make faces at me. I thought it was all over with me, and that I was to be annihilated—my usefulness put an end to. My friends said I was no pretender, that I didn't mean to set myself up in opposition to anybody, and wanted to be left alone. With a parting shrug and a parting grimace he laid me down and said, "Very good. Yes; but—what is the character? How many meshes? and the height, and the blue cup? All of which were answered as soon as they could be, and I was let alone for a bit. Only for a bit, for he begged me of my owner, and packing me carefully up took me with him, and I have been tormented ever since. I have been exhibited and charged with passing myself as the safety-lamp. I have been put into fire-damp. Fire-damp has been blown into me, and I have been burnt to death—all to see if it were possible to light gas through me. "She wur like a haycock," was the description given of me by a ranter preacher—an infinitesimal coal owner—and I don't know all what. I have, in irony, been called the safest of all lamps to go in amongst gas with, because nobody of any sense would go into gas with me. It was in vain I protested that I only pretended to be safer than an open light, while I gave nearly as much light, and that I had saved many people from being burned. It was of no use; they wanted a lamp to stand a current of air, no matter what light I gave. It was pointed out in my behalf that I didn't force myself upon them; it was much against my will I was brought there. They answered the Scotchmen didn't know any better. I gave it up, and thought I would tell my woes to you. Do pity a poor—

SCOTCH LAMP.

SAFETY-LAMPS.

SIR,—The interest prevailing respecting the above subject induces me to offer a few remarks with regard to the Mueseler type of lamp. No one can have gone through the most elaborate and exhaustive tests, extending over a number of years, conducted by the Belgian Commission, resulting in their adopting a lamp of stated dimensions, without being satisfied that they had good grounds for coming to that decision. The safety of the lamp undoubtedly depends upon the excess of carbonic acid gas produced in an explosive atmosphere, beyond what is allowed to pass away when burning in pure air, being utilised for smothering the flame. A careful examination of a properly constructed lamp will show the elongation of the flame in an explosive atmosphere, and its attempt to pass up the chimney. The conical form of the chimney, however, offers an obstruction to the escape of the carbonic acid gas, which, together with its own specific gravity, causes it to fall, filling the glass chamber, and removing the flame from the wick. This in turn is carried by its affinity to oxygen to the underpart of the horizontal gauze, and it will continue to flicker for a few seconds round it until the glass chamber is full of carbonic acid gas, when the flame expires. If, however, by any arrangement the ventilation of the lamp can be restored so as to allow the chimney or cone to free the glass chamber, or if it becomes a downcast, and so be able to feed the flame, the temperature of the atmosphere may possibly be raised so as to overcome the resistance of the cone or the gauze—the flame having passed to the outer gauze—it then becomes a more dangerous lamp than the Davy or Clanny. The chimney or cone, surrounded by flame of an exceedingly high temperature, rapidly becomes red hot, and not being able to part with its heat contributes to the risk of overcoming the resistance of the outer gauze, and firing the surrounding atmosphere. The diameter of the gauze being greater than in the Clanny or Davy permits a larger body of flame, also assisting to increase the temperature. A properly constructed Mueseler will stand a higher pressure of explosive gas than any lamp in use. The outlet of the cone should not exceed a given diameter, and the horizontal gauze should be perfectly fitted round the chimney and upon the top of the glass. The wider the outlet of the chimney the greater the risk of the flame passing through it, and a small defect in the mesh of the gauze next to the chimney will readily permit the flame to pass with the result stated above.

I have recently met with several instances of Mueseler lamps being adopted, and have found in some cases the chimney and horizontal gauze taken out altogether, or the gauze has been fitted without regard to its being perfect cone cut down $\frac{1}{2}$ or 1 in. in length, increasing the diameter of the outlet considerably, completely nullifying the use for which they were intended, and making the lamp dangerous.

A safety-lamp with the horizontal gauze and chimney of proper dimensions, without the outer gauze cylinder, is infinitely safer than when fitted with a perfect outer gauze and an imperfectly constructed horizontal gauze and chimney, under a pressure of gas from 6 to 15 ft. per second.

One not the least of important facts is the improvement in the illuminating power of the flame in the Mueseler type of lamp. Comparing a flame covered with this form of top with a Clanny, the light is greater by 20 to 25 per cent. This percentage is about the amount of rays of light absorbed in their passage through the cylinder, according to the purity or thickness of the glass. The ventilation of the Mueseler lamp, which may be briefly described as an upcast shaft within a downcast shaft, causes the air to travel down the side of the glass chamber, whereas in the Clanny the air rushes through the gauze directly on the light-giving rays of the flame, cooling the flame and depreciating the light. It will be found on testing with the photometer a Mueseler lamp will give as much light, surrounded with a glass cylinder, as the naked light, but the Clanny will show that, although tested with the same flame and glass surrounding it, a loss of 20 to 25 per cent. I am indebted for this information to Prof. Wills, of London, who pointed it out to me whilst engaged in making tests of the illuminating power of different lamps.

Another important advantage (although a difference of opinion exists on this head) is the extinction in a very short space of time of the light when placed at an angle beyond the outside edge of the chimney. This causes the ventilation of the lamp to be partly reversed, throwing the results of combustion on to and extinguishing the flame before ventilation is completely changed. Again, when the lamp is placed in an atmosphere of gas travelling at a high velocity, the ignition that takes place is not subject to anything like the same extent of force that other lamps are, for the flame is surrounded by

the glass, and all the means of supporting combustion it can obtain is through the horizontal gauze. In the Davy or Clanny the gauze fills with fire, and is subject to the whole course of the current, raising the temperature and intensity of the flame to an enormous extent much in the same manner as the heat of a fire is increased by forcing air into it.

In lamps fed with air from below the flame, with an outlet at the top, although not so quick or certain in its action on account of not having the same body of flame to act upon, will if the flame (however small) is maintained for a short time act much in the same way that a fire in a grate does when the opening, with the exception of a small space at the bottom, is covered with what are commonly known as "blowers," and so fire the gas surrounding the lamp. In short, any lamp that will retain a flame within its guard, although it may have left the wick sufficiently long to and be so ventilated that the gas is expelled by the current the lamp is submitted to, will produce so high a temperature that it will pass the covering in a state that will readily ignite gas as easily as the air can enter it under ordinary circumstances. It is not necessary to have a flame to ignite paper, or rather, I should say, a visible flame, for a piece of paper is readily lighted if held at the glass top of a lighted paraffin lamp, although no actual flame is visible to the naked eye.

If asked do I consider the Mueseler a perfectly safe lamp? my reply is, No! Nor can any lamp be considered perfectly safe while it is possible to place it in any position, and subject it to any velocity of illuminating gas, mixed with air to the most explosive point, so as to cause an ignition of the surrounding atmosphere. I feel equally sure that a perfectly safe lamp will be eventually produced if only those who are interested would not adhere so closely to beaten tracks, or try to respect known laws; and I shall be only too pleased to forward the introduction of any safer system of covering to safety-lamps.

Worsley, Sept. 17.

W. E. TEALE.

SAFETY-LAMPS.

SIR,—It will have been observed that there is a considerable difference in result in the experiments that have been made of late years with safety-lamps as to the velocity of current required to pass the flame from the inside of the lamp to an exterior explosive mixture. The following abstract is given of experiments made with the lamps now in ordinary use in coal mines to show the need there is of further trials, and of putting the matter in the hands of skilful experimenters, having regard to obtaining proper mixtures of fire-damp and air, and the exact velocity of current per minute required to pass the flame, if at all.

	Height.	Explosion.	Mr. Smethurst.
Davy	Expd. at 8 ft.	Explosion at 8 ft.	Expd. at 7 ft.
Clanny	Expd. at 9 ft.	Explosion at 10 ft.	Expd. at 10 ft.
Stephenson	Expd. at 10 ft.	No explosion up to 30 ft.	Expd. at 10 ft.
Mueseler	Expd. at 6 ft.	Explosion at 10 ft.	Expd. at 10 ft.

Trials have been made at other places which give still different results to those above; no information of a reliable character can be said to have been afforded yet by the experimenters.

M. E.

MR. SMETHURST'S EXPERIMENTS ON SAFETY-LAMPS.

SIR,—In Mr. Smethurst's recent experiments on safety-lamps the velocity of the current was ascertained by Dickinson's anemometer. The principle of this anemometer is that a given force of wind gives a fixed inclination of the vane. Supposing the reading (or inclination) to remain constant the force on the vane would remain constant, but if two gases of different specific gravities were used the velocities would be different. In order that the force be the same the heads of the gases would require to be different, since the pressure is the head multiplied into the density of the gas. Thus if A be the head of air which gives a certain reading, and G the head of fire-damp which gives the same reading, $G = \frac{A}{.55}$; .55 being the specific gravity of fire-damp. The velocities would also be different; that of the fire-damp would be $8\sqrt{\frac{A}{.55}}$, or $\sqrt{\frac{1}{.55}}$ times that of the air.

In Mr. Smethurst's experiments, when the anemometer registered 500 ft. of gas per minute the actual velocity would be $500\sqrt{\frac{1}{.55}} = 675$ ft. per minute. Of course a different proportion of gas and air would alter the specific gravity and velocity.

R. T. M.

Sept. 18.

TRIALS OF SAFETY-LAMPS AT WIGAN.

SIR,—In answer to the question of "An Engineer," in Saturday's Journal, I offer him the following account of an explosion which took place on March 30, 1873, whilst two miners were repairing an airway in the Old Mine at Bardsley Colliery, Ashton-under-Lyne, quoted from a paper "On the Davy-Lamp and Blasting in Mines," read by Mr. Joseph Dickinson, H.M.'s senior Inspector of Mines, before the Manchester Geological Society, on Dec. 19, 1877:—"Without any previous warning, it appears, a current of inflammable gas suddenly came upon them, and soon fired through one of the lamps. Both miners were badly burned, but one survived. He described that on finding the gas firing in the lamps they pulled down the wicks with the picker, but that being of no avail, consequent upon the gas burning the lamps, and the lamps getting too hot to handle, the flame passed through the gauze. The best science man in the world, he said, could have done no more than they did under the circumstances. The outburst of gas, it was afterwards found, came from a rent in the floor at a face of work. The issue, when I visited the place on the third day afterwards, was still continuing, but apparently pining off." One man having survived is a clear proof that a man "can" live in an explosive atmosphere long enough for a Davy lamp to pass the flame through the gauze.

JAMES ASHWORTH, M.E.

Southport, Sept. 15.

MANUFACTURE OF ZINC PIGMENTS.

SIR,—It will probably interest your correspondent "H. de C.," whose enquiry was answered in last week's Journal, to learn how the sulphoxide of zinc is produced, as he will then, if he tries the same process with a mixture of zinc and lead, more fully comprehend the reason of the reply given. A very fine zinc white is at present being manufactured by Mr. E. W. Parnell, of Liverpool, which is really a finely divided and very pure zinc oxide. In the process of manufacture he employs two solutions, one a solution of metallic zinc or zinc oxide in caustic alkali or caustic alkaline solution, and the other an alkaline sulphuret solution, such as sulphuret of soda and potassa. Employing two such solutions admit of easily purifying each solution separately, so as to ensure that when the said two solutions are mixed together in the proper proportions, preferably so that the supernatant liquor shall contain a small excess of the alkaline zinc solution, pure or nearly pure zinc sulphuret will be formed as a precipitate, and pure or nearly pure caustic alkali will be left in the liquid form. The said caustic alkali may be used again in the manufacture of zinc sulphuret, or otherwise used. After washing and drying, the precipitated sulphuret of zinc is ready for use as a pigment.

When a caustic alkali or caustic alkaline solution is used it is by preference subjected to heat and agitation whilst the metallic zinc or zinc oxide is being dissolved therein. The alkaline sulphuret solution may be prepared in any desired manner. Before use the alkaline zinc solution should be purified by the addition thereto of a small quantity of an alkaline sulphuret or suitable sulphur compound to precipitate impurities, and the alkaline sulphuret solution should be purified by the addition thereto of a small quantity of the alkaline zinc solution. In the latter case the zinc sulphuret formed carries down any impurities contained in the alkaline sulphuret solution that would interfere with the quality of the finished article. The manufacture of zinc pigment substantially, as above described, may be advantageously carried on in connection with the manufacture of alkalis by the Leblanc process, in which process the crude solutions of alkali are invariably contaminated with sulphurets. The said sulphurets may be used in place of the alkaline sulphurets above mentioned, whereby the production of the zinc sulphuret is cheapened, and pure alkali obtained at diminished cost. If found desirable to manufacture increased quantities of sulphuret of zinc the Leblanc process may be so carried on that the amount of sulphurets in the crude alkali shall be augmented. Now, if "H. de C." could get his mixed lead and blende

ores into solution, separate the zinc from the lead, and obtain the salts of both metals in as high a degree of purity as Mr. Parnell obtains his zinc salt, he would realise a fortune.

BLACK JACK.

Llanrwst, Sept. 15.

DISCOVERY OF POTASH SALTS IN MECKLENBURG.

SIR,—I was very much surprised to find in the *Mining Journal* of August 30 a letter from Mr. P. Scratchley, the secretary to the Continental Diamond Rock Boring Company, in which this gentleman takes upon himself to declare the assertion made in a notice on "The Discovery of Potash Salts," in the *Journal* of August 15, "that important layers of potash salts, according to experts similar in quality and quantity to those raised at Stassfurt, had been discovered in Mecklenburg, near Lübbtheen," as incorrect, and states that, although his company is engaged in the boring, no salts have been discovered yet, and that he, therefore, does not believe experts have ventured on such an assertion.

Mr. P. Scratchley does not seem to know, or he will not know, that at Lübbtheen previous borings have taken place, and that on Jan. 1, 1879, the chief mining engineer—Mr. Stoz—reported to the Mecklenburg Government the result of the borings, as follows:—

	Metres.	Metres.
Sand	from 0	to 25-900
Gypsum	25-900	288-360
Grey marl, with red and white salt grains	288-360	327-140
Salt	327-140	477-000

"The latter commences with carnallite, and corresponds with the salt layers at Stassfurt, according to samples and analyses made at Clausthal."

According to these results at a depth of 327 metres, or 1150 ft., salt has been found, and the borings were continued for 150 metres more, or 520 ft., always in salt, where the borings were stopped without reaching the end of the salt stratum.

Encouraged by these favourable results the Mecklenburg Government ordered further borings near Jesar, about 1 kilometre to the east of the previous borings at Lübbtheen, which were commenced in June last, and these are the borings to which Mr. Scratchley refers.

On my own estate—Jessenitz—which lies 2 kilometres south of the Lübbtheen borehole, I have had borings made, and a sample obtained at a depth of 45-50 metres, when the gypsum stratum was reached, was given to an expert for investigation, who expressed his opinion as follows:—"It appears to me that the result of the analysis is very favourable, and I am of opinion that salt may be expected with certainty."

At Lübbtheen 500 ft. of salt have been discovered, and if Mr. Scratchley is not yet convinced of the fact he will sooner or later find that the borings of his company will give the same result, and only serve to ascertain the extent of the salt layers, which such authorities as the well-known Prussian Mining Inspector Ottilie, at Clausthal, and others have pronounced very large indeed. As you have given publicity to the letter of Mr. P. Scratchley, I hope you will also find space for the above.

E. MEYER.

Jessenitz, near Lübbtheen, Sept. 12.

THE LONDON COAL SUPPLY.

SIR,—The important article in your issue of Sept. 13, on the coal traffic by railway to London, which corroborates the most explicit evidence of the Chairmen of the London and North-Western and Great Eastern, and of the general managers of the Midland, Great Northern, and Great Eastern Railway Companies, that water carriage from Yorkshire, Derbyshire, and Notts is by far cheaper than by rail to London, commends itself, as emanating from the very summit of the technical press in the speciality, to the serious consideration, not merely of the coalowners, who may be fortunate in not being involved in railway investments and entanglements, but to the miners in general, who, I am glad to observe, are severing their connection with paid spokesmen. By all means follow up this course, classed under whatever nomenclature such mercenary auxiliaries may be. You require your surplus earnings for other more pressing and recurring wants. If my memory be correct, the miners contributed largely to the Plimsoll fund. I wonder if the miners can look forward, in their great need, to any material or moral support from the originator of the coal drops and bays at the Great Northern metropolitan terminus in consonance with modern social innovation, so dissimilar to the code of a bygone age. I have never seen an account of Mr. Plimsoll's disbursements of the large amounts lodged with him, to which I look forward. The sole cause of the miners being engulfed in their direful state is the exorbitant rate of transport of the coal by rail to London. Supplant that by water carriage, and, as it has been so exhaustively shown, they will be placed in the permanent receipt of a remunerative scale of wages, by the coalowners having an unassailable monopoly of the London coal supply at many shillings per ton advantage over the Tyne, Hartlepool, &c. My letter in the *Journal* of July 19 last showed that by the adoption of my system of water transport, &c., a saving can be effected over the existing system of 11s. a ton, based upon the average selling price, and 15s. a ton for a decennial period; but even at a much reduced rate of economy what an immense future of prosperity to the predicted inland coal fields presents itself. I do not propose the constitution of a company to convey from the pits to consumers' premises in the Metropolis a mere portion of the output, but I solicit the material co-operation of the coalowners, and moral impetus of the miners, disembarassed of mercenary spokesmen, conjointly in the incipient initiative or preliminary measures. With such, and a plethora of capital ready to invest in the London coal supply, there is nothing to prevent the total displacement of the railway coal traffic, and the concomitant consequent cessation of the Plimsoll coal drop tribute at the Great Northern metropolitan terminus. Further, the annihilation of the London wholesale coal merchants' traffic, as the coalowners will sell direct to the consumers, as already carried out with such success by some of the largest collieries.

The representative of the Miners Association of South Yorkshire gave evidence before the Select Committee to inquire into the dearthness of coal, thus—"If you want cheap coal for the public the coalowners must go direct to the consumer. There is half the nation living out of the profits of coal, turning it over from hand to hand. The railway system will have to be broken down if you are to have cheap coal. I have proof of a coal merchant having a profit of 20s. a ton on 1500 tons."

The Tyne, Hartlepool, &c., cannot compete with the much shorter distance and better navigation from the Humber and Boston Deepes, and with the system proposed. This has been so fully explained that it would be inadmissible to recur to a repetition of such voluminous matter. The coal factors clamour is futile, and utterly below the notice of serious business men. One of these Coal Exchange magnates gave evidence before a Parliamentary committee on April 2 last year—"All coals, so far as Durham home trade is concerned, came as consignment. Rail from Durham, 10s. 10d. a ton—plus truck hire, 1s. 3d., have tried to sell South Yorkshire coal with a perfect failure as result; the bulk of the consuming public do not look at relative value of what they buy, but simply what is cheap—not what is good." His praise of the Welsh steam coal is heavily counterpoised by the fact of one-third small or dust perfectly useless existing in the Welsh, whilst the excellent Yorkshire, Derbyshire, and Notts steam coal can be delivered, into the bunkers in large lumps, free of small. An Admiralty report is very damaging to the use of Welsh in lieu of pre-iced steam coal—vide my letters in the *Journal* of July 19 and 26 last. The present occupiers of the Coal Exchange will permit me to avail myself of the application of an exclamation of a woman of genius and good sense. "C'est prodigieux tout ce que ne peuvent pas ceux, qui peuvent tout." The Coal Exchange can be turned to infinitely more profitable account than at present by no means hyperbolic, the Corporation continuing to receive the City dues with or without a coal market; as far as its use for the sale of coal in the future, the language of "Pascal" is not inapplicable—"Le silence éternel effraya."

The Bawtry scheme shows at all events the immense saving over rail transit even by a very tortuous and defective water conveyance to London, falling, however, very far short in economy of my system as already laid bare in the *Journal* of July 19 last. As to the Hull-Barnsley proposed railway, their rate is more to Hull than of my

system to the Thames from the pit mouth, and with the multifarious advantages nature has placed within the reach of Yorkshire and Lincolnshire in water-courses, rivers, canals, and canalized rivers, the scheme is totally absurd, and not deserving the consideration of legitimate coalowners, miners, and others interested in the welfare of the thousands dependent upon and benefited by really cheap transport. My letter in the Journal of the 30th ultimo stated—"The thirst after gain compelled the late York silkmercer, and other novices to throw themselves into a vortex of financial phrenzy, amassing fortunes as if by enchantment, so that if we take a retrospective view of the railway epoch we shall not have much difficulty in discovering a system of gambling unexampled in any age or clime." Well do I remember Hull at that period, and the prevailing railway excitement, but times have changed. The Hull Dock Company will please observe that the steamers I propose will studiously eschew entrance into their docks, even if they have to pay the dock dues when loading in the roads practised by so many large steamers. In the Tyne the latest dispatch novelty is the deep-water drops in North Shields, displacing the dock accommodation as far as their capability extends, which has not been attempted with the foreshore at Hull. Whitebooth, Grimsby, and Hawk roads offer, according to the wind, safe shelter points to load at, but within Spurn Point, according to the last survey by Capt. Parsons, of H.M. ship Porcupine, we have constant deep water (at low water), 51, 31, 24, &c., feet, and by means of an entirely new system of an excavator just successfully tested under Government inspection."

"Batho's Patent," the photograph of which I have before me, the North Channel and Partington Navigation can be deepened at a trifling cost, and kept permanently free of silting up, so as to afford every facility for the shipment of 5,000,000 tons of coal annually. The Hull Dock Company will do well to weigh seriously their position as independent of the London coal traffic; the general export trade of Hull can be displaced, "stiffening" coals being supplied to the vessels discharged in the various docks and loaded up down the Humber; via the Seine, the company's material can deliver steam coal in Paris and the Seine at many shillings a ton under present prices. The largest, wealthiest, and oldest coal firm in Paris, simultaneously Belgian colliery owners, have agreed to act as consignees guaranteeing the sales. I hold certificates from the late Mr. Thomas Brassey, from the largest coal exporters in this country to France, from the late general managers of the Great Northern and Great Eastern Railway Companies, and from multifarious other highest class sources, certifying as to the correctness of my calculations and data. I am prepared with much further matter, but dare not infringe more upon your valuable space. WM. JOSEPH THOMPSON.

20, Little Tower-street, Sept. 16.

ROCK-BORING MACHINES.

SIR,—Considering the importance of rapidly opening ground in mines, I think some statistics of the work done at the Ballacorkish Mine during the past month by one Darlington borer deserves to be recorded, and will interest many of your readers. With a falling lead market for many months past only hand labour had been employed, as rapid opening of ground was unimportant, but the agent (Capt. Barkell) having estimated that it would cost rather more than double the price to reach the required lode if hand labour were used, he was authorised to resume machine work, and so well has he organised the work that 44 yards of the 60 fm. level (7 ft. by 4 ft. 6 in.), in very hard greenstone and tough killas, has been done in the past four weeks, using one Darlington machine only. The following are the statistics from the boring reports:—

Number of hours boring	351
" holes	434
" of feet bored	1846
Dynamite used	449 lbs.
Stuff removed	379 tons.
Distance over which the stuff had to be removed	200 fathoms.
Number of men employed	6 miners.
In removing stuff to shaft	3 labourers.
Wages earned by machine men	£1 12s. weekly.
" labourers	£1 0s.
Average depth of holes	50 inches.
Hours worked	449 or 84 per cent.
" hindered	50 " 94 "
" fixing air pipes	34 " 66 "
533 or 100 per cent.	
Cost of compressing air per fathom, wages, explosives, and candles	£5 12 0
Machine speed weekly	11 yards
Hand	3 "

A speed $\frac{3}{4}$ times that of hand labour has thus been obtained, and at a cost less than that of hand labour.

If those who still assert that hand labour boring can compete with machine boring would see the kind of rock in which the work above described has been done they would admit that with a good borer, and such perfect arrangements for speed as Capt. Barkell has made, no hand boring speed can approach it. The Darlington borers seem to be doing good work at Minera also. I see the directors' report of last month says—"The working of Darlington's drills in the west end has been very satisfactory, and they have materially assisted in keeping up the quantities of ore." FREDK. S. KING.

London, Sept. 17.

AIR-COMPRESSORS, AND ROCK DRILLS.

SIR,—The important bearing of this subject on mining, more especially in deep coal mines, has led to the institution of numerous experiments on rock-drills. Among these may be noticed the experiments made by Mr. Mativa in 1877, the engineer to the Levant du Flénu Colliery, in Belgium, with whom were associated four other mining engineers of Belgium. Rock-drills are largely utilised in the mines of this country, owing to the number of cross-measure drifts required; the speed and economy of these machines are, therefore, points of the highest importance to determine. At this colliery a large air-compressor has recently been erected. The chief systems of air compressors have been commented upon by Mr. Mativa. They are classed as dry and wet. The latter have the great advantages of counteracting the high temperature occasioned by compressing air, and of preventing loss of air by leakage and clearance. This is effected by a spray of cold water injected into the compressing cylinders.

The air-compressor at Levant du Flénu consist of two 23½-inch vertical single-acting compressors, fixed over and worked direct from two 17-in. steam-cylinders. The compressors have water-jackets; the steam-cylinders have steam-jackets. The engines are coupled at right angles by a crank-shaft, on which is fixed a fly-wheel of 7 tons weight. The stroke of the engines is 3½ ft.; they are fitted with expansion gear variable by hand. From 30 to 40 revolutions per minute are made, and the total compression of the air is from four to five atmospheres. The compressors are open at the bottom. There are four 5½-in. inlet valves in each compressing piston; these with the four delivery valves, 5½ in. diameter, at the top of each compressor are of gun-metal, working on gun-metal seats; valves are 8 lbs. in weight. The cold water is injected at the top of each compressor, supplied through four horizontal nozzles. Each nozzle has 90 apertures 1-24 in. in diameter, arranged in two circles of 50 and 40, all converging towards the axis of the nozzle. From these small jets are injected against an inverted conical button, and thus distribute a fine spray within the cylinder. The injection water is supplied by a force-pump, which is worked by an eccentric fixed on the crank shaft. The injection takes place in the upstroke of the compressor piston during the compression and delivery of the air. By this method the temperature of the air on entering the receivers, of 2440 cubic feet capacity, is maintained at 13° Fahr. only above the temperature of the external air. The temperature of the atmosphere and injection water being 50°, the quantity of water injected at a total pressure of four and a half atmospheres was 0065 cubic feet, or 11-23 cubic inches per cubic foot of air at atmospheric pressure, to maintain a temperature of 13° only above that of the atmosphere. The indicator diagrams taken during the experiments show the useful effect to be 85 per cent.

Nine varieties of rock-drills were sent to the colliery for trial. With three of these numerous trials were made, being those of Dubois and François, Dunn, and Schram. Of the other six no extensive trials were made, being those of Ferroux, Ingersoll, Sachs, Taverdon, Trantz, and Turettini.

The following is an abstract of trials in respect of boring horizontal holes in carboniferous limestone, with three and a half and two and a half atmospheres respectively effective pressure:—

Effective pressure.	Length bored.	Boring per minute.	
		Excluding tool changing.	Incl. tool changing.
Three and a half atmospheres.	Inches.	Inches.	Inches.
Dubois and François	47-24	4-96	4-49
Dunn	41-33	5-40	4-06
Schram	45-27	5-71	4-92
Two and a half atmospheres.			
Dubois and François	47-44	3-50	3-19
Dunn	49-80	4-25	3-50
Schram	40-16	4-14	3-58

The Dubois and François piston being 3½ in. in diameter, the Dunn 4 in., and the Schram 3½ in. The tool was changed twice in the Dunn drill. The first 20 in. driven with a 1½ in. drill, about 10 in. with a 1 9-16 in. drill, and the remainder with a 1 7-16 in. The two other machines were each changed once only—about half the length driven with a 1 9-16 in. drill, the remainder with a 1 7-16 in.

The power expended on each drill was measured by the consumption of compressed air. This was obtained by charging the receivers =2440 cubic feet capacity, at three and a half atmospheres effective pressure, observing the reduction in pressure that ensued in boring holes of 47½ in. long and 1 7-16 in. final diameter. Similar trials were made with an effective initial pressure of two and a half atmospheres, with these results:—

	Effective pressure in atmospheres.	
	Initial.	Final.
Dubois and François	3-5	2-5
Dunn	3-01	2-06
Schram	2-84	1-99

It should be observed that as the Dunn drill requires two changes in boring the length of 47 in. and a larger initial diameter, it pulverises 18 per cent. more rock than the Dubois and François drill, which takes one change.

The Dubois and François and the Ferroux drills are fixed upon their stands at two points. These have an advantage in steadiness of working over those fixed at one point, as are the Dunn, Schram, and Ingersoll, particularly in boring horizontal holes. C. E.

CANADIAN MINING NOTES.

SIR,—The hot summer drives the inhabitants of cities into cool and refreshing places, and they become denizens of the country. Thus it is that Brockville and both sides of the river between Kingston and Brockville become populated with their summer guests. The St. Lawrence, issuing from Lake Ontario at Kingston, seems not to be able to overcome the masses of Lower Silurian, or, as Sir Wm. Logan called it, the Laurentian formation. These still remain, and the river contents itself with flowing round them, thus forming the Lake of the Thousand Islands. These islands, some like dots, some large, some larger, studded with verdure, of all shapes and sizes, with the clear river forming fantastic channels around them, fail not to entrance and awaken the admiration of the visitor. This part of the St. Lawrence, has become famous, and the tourist scarcely claims to have travelled in America unless he has seen Niagara, and passed through the Thousand Islands.

But it is within the last six or eight years that the attention of the citizens of New York and Philadelphia has been drawn towards this group. At Alexandria Bay, 24 miles west of Brockville, on the American shore, for many years there was a small fishing hotel, kept by a man named Crossmon. The beauty of the river at this point, the health-giving air, and the plentiful supply of fish even then, were gathering those who delight in the sport. By degrees others came. Then the Thousand Islands Hotel was built, capable of accommodating 400 or 500, and then Crossmon had to build a new hotel, then Pulman, of car notoriety, settled there on an island for his summer residence, Mr. Howard, of New York, and others. Then the Thousand Islands Park Association was started between Clayton and Alexandria Bay, on Wellesley Island, and afterwards Westminster Park, on Wells Island, opposite the bay. These park associations are the outgrowth of the old original Methodist Camp Meetings, but they have improved on the original, so that the fanaticism, singing, yelling, weeping, and fainting formerly the concomitants of those "getting religious" at such gatherings, have almost entirely disappeared, and the association is conducted with such common sense and refinement that the stay is truly enjoyable. The *modus operandi* was as follows:—First, the association was formed by a lot of members taking certain shares, with these shares the property was bought, a tabernacle was erected, the survey made, a town started, and lots sold to those who wanted to live there during the summer. The meetings begin in July and last till September, and what with lectures, readings, preaching, boating, fishing, and going down to Alexandria Bay, the Methodists of to-day make out to enjoying themselves moderately well, and to have what is known as a "good time." It has also had the effect of making religion more popular, and teaching people that enjoyment is not incompatible with religion. If they would preach the sermons of Canon Farrar and be a little more charitable, and not so ready to send others to hell who do not happen to agree with them, they would do greater good.

Westminster Park is a similar association on Wells Island. Now, excursions nearly every day from Kingston, Brockville, Ojdisburgh, Watertown, Utica, Gananoque, and Ottawa, besides the regular boats and means of travel, the "trippers" are numerous to Alexandria Bay and Thousand Island Park.

Added to the religious part of the association, and good they do for others, I hear that the venture has been successful, and they have done a good deal of good for themselves. The profit appears to have been of two kinds—both heavenly and earthly. It seems to me to be a wonder that the Church of England has done nothing of that kind. With her wealth of resources, both in men and money, in intellect and education, she could surely do much more good than the Methodists, while she would keep the straying and instruct the wanderer.

The northern side of the St. Lawrence is much the best, and that is British, yet it is the least inhabited. Almost all the fine summer houses are built on the Yankee side, and the parks and associations are all on that side. Canada, however, furnishes the fish for the most part, and the bays and creeks of the river on the northern shore attract the boats and sporting men of the South. As for the property in the fish, on either side it is entirely free. Whoever catches his fish owns it, no matter where it is caught. I suppose that arises from a sort of courtesy which has grown up between the two countries, and because the fish are caught not for commercial purposes but for sport.

The geological formation of the river is interesting. A short distance above the town of Brockville the Laurentian series is found, though it is not so much mixed with dolomite as in many places. Granite also is found on the islands and main shore. Granite as good as the Scotch granite, and Mr. Forsythe, the stone-cutter from Montreal, bought an island near Gananoque, and has taken out a good deal, which he manufactures into pillars and slabs. It has a beautiful appearance, and it may be that before long Canada will obtain a celebrity for granite equal to that of Scotland.

At Rockport is found some galena, probably the same vein which has been worked near Lindhurst, in the rear of Leeds, and which comes through the country, passes the St. Lawrence, and crops out in Rossie, in the State of New York. Back of Kingston, at Buck's Lake and Opinicon Lake, there are large deposits of apatite. A good deal has been taken away and shipped to England for the purpose of manufacturing superphosphate of lime. The last shipment was some 800 tons, averaging 75 per cent., and giving as high as 80 per cent. phosphate. This was sold for \$10 a ton at Brockville, and shipped to Boston. At Lindhurst the lead mine was worked for several years. The company was called the Canada Lead Mining Company, but they did not find enough galena to pay the working expenses of the outlay, and so they stopped, the plant being for the most part transferred to the Frontenac Lead Mine.

It is a curious thing with regard to the lead mines in this country that both the American and Canadian deposits have not been successfully worked. This would be a greater reason for the deep system of prospecting being adopted than ever. This system is that which prevails in Missouri, where they test the quality of the mine for 500 or 600 feet before erecting buildings and beginning the regular work of mining. In this way they discover where the paying portion of the mine lies, and can form an estimate as to the probable results. With such deposits as we have in Canada, and with our duty against foreign lead, there are great inducements for the proper and successful working of the mines being discovered and entered upon.

A great quantity of iron pyrites lies in the vicinity of Brockville, and as they manufacture sulphur acid out of it one would think the Hollway process would come into use. I should think the holders of the Hollway process patent could find no better field for its introduction than by opening up communication with the Chemical Company, Brockville; Mr. Robinson is the manager. BOURNONTITE.

Brockville, on the St. Lawrence, August 16.

LEAD AND LEAD MINING—No. IV.

SIR,—Since I commenced my contributions to your columns I find this subject has met with a general notice; your daily contemporary, the Standard, amongst others, publishing a long and exhaustive article on the subject. The opening remarks are well worthy of repetition. "Not the least of the mineral industries of this kingdom is that of lead mining, which has known the great fluctuations common to such industries in the last six or seven years. It knew a considerable growth in the output during the years of briskness, and though in the years of dulness, that follow as surely as the years of famine follow those of plenty, the falling off was not great, yet that dulness was reflected in diminished output as well as lower prices, and though the depression in the lead mining industry has not been so loudly proclaimed as that in the kindred industries of iron and coal it has been deep and widespread." Then follow the figures which your columns have already fully published, showing that whilst in 1876 the value of lead ore was 1,200,000L, it fell in 1878 to 800,000L, the difference in production being not 2000 tons, thus showing how serious has been the drop in prices; and it must be borne in mind that this loss of 400,000L. has fallen chiefly on the mining capitalist, representing, as it did, a considerable portion of his profit, the expenses of raising, dressing, &c., remaining the same, or very nearly so. Almost the only district which has increased its output under these hard conditions is Wales, which from an output of 23,200 tons in 1876 rose to 25,200 tons in 1878. It reflects great credit on the adventurers of this district that under such disastrous circumstances they are able to show such a creditable result; no doubt it is in some measure due to the fact that lead mining in Wales is very economical, owing to the great facilities for rendering water-power available.

The price of lead does not show any improvement this week, but an active demand must soon arise, and stocks everywhere are very low; nor are we likely to suffer so much from the imports of Spanish lead, which amounted to over 100,000 tons last year, as it does not pay them to send it here at present prices, and the large stocks which accumulated during the Carlist disturbances have been worked off, thus they cannot again flood the market when prices become better. The import of American lead may also, for the present at all events, be looked on as a thing of the past.

These hard times when they have passed away, which let us hope will be shortly, will have left a stern but useful lesson behind them—economy. I venture to say there is hardly a mine that has not from sheer necessity learnt some lesson of saving that was never dreamt of with pig lead at 22L 10s., but which, once discovered, will not again be lost. Let me here bear a tribute of praise to the conduct of the working lead miner during this period of depression. He has submitted, I may not say cheerfully, but willingly, to a reduction of his wages to starvation level without a strike or a murmur, and I am glad to find even now that employers are recognising this forbearance by giving a little increase as the times improve. This fact of the absence of disruptions and disputes is one of considerable importance to investors, as the stoppage of a mine from any cause means far more than a mere suspension of business—it means serious risks and heavy expenses; nay, more—perhaps disastrous accidents; add to which, idle machinery always gets out of order, whilst rents and taxes do not. It is a long time in the history of lead mining since such a serious drop in prices took place; let us hope when once we recover we may have another long spell of prosperity. One thing is certain, and that is that lead mining has become more than ever a science, requiring both brains and experience, and I think it will be found that mining engineers have as a rule risen equal to the occasion. It needs but a glance at your columns to see this. I have often thought it hard that the metalliferous engineer, who directly adds to the wealth of a country by his labours, often at the risk of his life, should obtain so little recognition. Black sheep there may be, but it cannot be denied that the man who successfully draws from his dangerous and deftly hidden store the mineral without which in its present phase human life could not subsist is equally as deserving of reward as he whose works plough the seas, bridges our rivers, or almost annihilates time and space on our railroads, bearing in mind that none of these could exist without the prior labours of the mining engineer, yet we see rewards lavished on the former, whilst we see the latter unacknowledged. Personal experience enables me to say that his birth is no sinecure, nor can I see any reason why he who by study and toilsome labour in a noxious atmosphere, at imminent risk to his life, and who adds millions to the wealth of his country, should not be as fairly entitled to a knighthood as a successful railway engineer, or as a civic magistrate, whose highest qualification is that he has satisfactorily appeased the appetite of some foreign potentate.

"Revenons à nos moutons." With regard to the mineral lodes which traverse our globe, it is not to my purpose to account for their existence. We have them, and that is sufficient. Confining myself to lead lodes, I may say there are but two classes of deposits:—1. Those which are found in regular lodes, more or less at right angles to the earth's surface; and 2. Those which are found in flats or beds chiefly in the limestone formations. With regard to the former, they generally run either north and south or east and west (when I use these terms I allow myself a latitude of 20°); but there are, besides, what are termed caunter lodes, but they are comparatively rare and unproductive. The surface of the earth would appear to have undergone two series of violent contortions, one of which formed cracks from east to west, and the other from north to south; and these cracks or lodes became, somehow, filled with minerals. Consequently we have various widths of cracks, and we have every reason to believe that for all practical purposes these cracks extend in depth to an extent unfathomable—they have already been proved productive to a depth of over 2000 ft.

Lodes do not continue of a uniform width, nor in a straight line. If anyone will take the trouble to tear a piece of paper in half in a serpentine direction, and having moved them about ½ inch apart slightly draws one piece up or down, it will at once be seen that there are large openings in one place and correspondingly narrow ones in another. This is just what occurs in mineral lodes, which open and close with a most tantalising irregularity, causing one mine to be rich and prosperous, whilst its next door neighbour is poor and unproductive. These lodes are not always found exactly vertical, but what is technically called having an underlie; thus a north and south lode has either an east or west underlie, as the case may be, and vice versa. Consequently it not infrequently happens that two lodes, by underlying towards each other, come together in depth, and perhaps continue downwards together. It is generally supposed, on what principle I do not know, that where two lodes come together from any cause deposits of ore are to be expected. This is frequently found to be the case, consequently it is always looked upon as a favourable feature, whether it occurs by a north and south lode crossing an east and west one, or, as I have mentioned, by a difference in underlie; but it also frequently occurs that a violent disturbance is found to have taken place, taxing the skill of the engineer to the utmost to discover where the lode or lodes resume their regularity and productiveness.

I ought here to explain that although a lode does not keep in direct line, it generally what is termed keeps it bearing. Thus a straight

line drawn from one point of a lode to another at some distance would find the lode sometimes one side of it, sometimes the other, but never very far away. But even this is not a hard and fast rule, but I never knew a lode to turn to anything like a right angle. When it is borne in mind that lodes traverse the country in a comparatively straight line, regardless of undulations of surface, being found alike at summits of the hills and the bottom of the valleys, I think I have said enough to clear the way to a short explanation of mining operations (with your permission) in my next.

HOPEFUL.

SALES OF TINSTONE FROM CORNISH MINES.

SIR,—In the first communication from your correspondent "Observer," that consistent (?) writer expressed surprise at so many mines selling tin in the stone, and on my following, in nearly similar strains, he turns around and abuses me. It seems that by treating his communication as an attempted puff of Wheal Prussia I hit that gentleman straight in the eye. Some weeks ago there was an attempt to puff off this mine, as of a similar class mine, with Wheal Peavor and West Peavor, and now it is attempted to make one paragraph embrace East Pool, Wheal Agar, and this Wheal Prussia. All the other mines thus have ground to work upon to any depth, whereas Wheal Prussia is in the midst of a sea of water, like a crab-pot with the bottom knocked clean out. Let "Observer" enquire how much of Wheal Prussia lode has been worked away from Cardew, which mine is now full of water, and this will, I think, be an eye-opener for him. "Observer" says that he has no interest in the mine. I do not suppose he has; he may be paid for writing, though I am sorry that "Observer" has thought proper to abuse somebody else (who deserveth it not) just as if there had been only one person hailing from Old Broad-street. I may inform "Observer" that there are rather larger numbers hailing from Old Broad-street than from the particular corner of Illogan to which he claims an interest. He notices a mine which he calls Wheal Agnes, which he says is 260 fms. deep. Now, I do not happen to know where Wheal Agnes is, but Wheal Prussia will never be put to that depth by the present "influential proprietors," for before they have attained the quarter of that depth they may reach the lower part of the crab-pot with the bottom knocked out, and find a grand haul by holing to old workings now full of water. "Observer" accuses me of speaking disparagingly of Cornish merchants. I had certainly no intention of doing such an irreverent thing, only of showing that they were not the parties to supply much money for pumping out old mines, although they certainly can have no objection to others doing so, provided they can get paid for the materials; some do not even object to being paid twice. I could point out a Cornish merchant who is manager of several tin mines, and another merchant, an acquaintance of his, has arrangements below more than one of his dressing-floors for catching the tin going down the stream. The dressing-floors belong to the mining companies, but do the arrangements below? Here is a plan by which a man may be paid three ways—first as a merchant, second as an agent, and third by having a share in the arrangement for catching the tin below the dressing-floor. I do not suppose that such is the case here, for they are both, I believe, religious men, or if not both so one is, and the other is half and half that way. Neither did I intentionally speak disparagingly of the Stannary Court, only have a rather special objection to being slipped in there, and made to pay debts contracted without my knowledge. The representatives of the mines abused by "Observer" can take care of themselves I no doubt, but if your correspondent wishes to puff Wheal Prussia, why does he hit thus at random people who otherwise might have left him alone? He rejoices in having 100 tons of tinstone to sell. Will he tell us what is the cost of working the mine while raising this 100 tons of stone? Will he also tell us when the pumping machinery for pumping out the old mine is to be started? I am informed that they are under an agreement with the lords to do this within the next ten months. If so, would it not be as well that they should commence the real working of the mine soon, if they intend carrying out that arrangement; or is "Observer" employed to try to slip the shares off on other people before entering upon so costly an experiment?

Old Broad-street, Sept. 17.

SCRUTATOR.

TREATMENT OF TIN ORES.

SIR,—Allow me to thank Capt. Chas. Thomas for his manly, outspoken, and argumentative reply to my letter on the above subject, and although we disagree on some points, which I shall hereafter endeavour to put him right on, yet it is very evident that he, like myself, can see that great improvements ought to be effected in this, "the most vital department of Cornish mining," before we can reasonably expect to hold our own in the severe competition going on with the foreigner. Capt. Thomas says "that trams and stone-breakers may be right enough in half the mines of the county." Then why, I ask, are they not introduced? We are saving by this means 85 per cent., as compared with hand spalling. Again, Capt. Thomas says, "I do not hesitate to predict that round buddles will be in universal use when the jiggling process has been forgotten." Has Capt. Thomas seen the jiggling process applied to tin? I venture to say not; therefore, my advice is to try it before jumping at hasty conclusions, after which (I believe Capt. Thomas has too much good sense to say) with a certain mine agent, that he would not believe what he saw) his prediction will be that jiggling will be universal when the round buddle is numbered with the past.

Capt. Thomas admits we are losing one-sixth of the tin by the present mode of treatment, and at the same time says the round buddle is being successfully worked in Carn Brea, Tincroft, and Cook's Kitchen, where, he avers, through their instrumentality the slimes are to a very great extent untinned, and allowed to flow off in a little slimy waste. How, then, can Capt. Thomas account for this enormous loss? Whilst the dressing costs in many mines are nearly double what they should be. I maintain the round buddle is a bad separator and worse classifier, and without classification all our attempts at tin dressing will be imperfect, and the results obtained never what they ought to be. If Capt. Thomas read my letter rightly he would find my argument to be classification from the front of the stamps, instead of allowing the tinstuff to run into the round buddle. By so doing the separation would be crop, and what we call small (second size and the slimes); each of these would then be treated separately, and with such a mode of working I am quite prepared to prove more tin will be realised from the same quality stuff at a considerable reduction in the cost, this being the very tenor of my argument.

We are doing it at Wheal Jane at the present moment, although our floors are not yet completed. Capt. Hall, who is well worthy the name of a practical dresser, will tell you there is no worse stuff to dress in the county than Wheal Jane, and taking the three mines named by Capt. Thomas as a criterion, I very much doubt you will find any so difficult.

Supposing my experience of tin dressing to be on such a narrow gauge as "I. C. U.'s" brains are, of one thing I feel certain, and that is I shall shortly have the pleasure of convincing Capt. Charles Thomas that, instead of sending coats to Newcastle, we shall be in a position to send more tin from Wheal Jane to the smelting house out of the same quality of stuff, at a reduction of fully 85 per cent. in our costs. Fabulous as these figures may appear to one who, like "I. C. U.," is too great a coward to append his name to any ideas he may wish to have ventilated in the public Press, yet, nevertheless, they are facts, which are being corroborated every day.

Again, when mines are "knacked," with large accumulations of leavings on the surface, there is a scramble as to who shall become the possessor, and in many instances thousands of pounds have been made out of them. How is it, I ask, that shareholders do not participate in the profits that can be obtained from these halvans while the mine is in full work? I should be only too pleased to take a contract to re-dress the immense heaps already accumulated, with all that may come forward in the future, from either or all of the three mines previously alluded to, provided they do not deviate from the present mode of treatment, and will pay the adventurers a reasonable tribute, free of all costs of working and erections.

In conclusion, I beg to say that dressing, especially in Cornwall, is not what it should be, and my sole object is to try and remedy an evil which every mining man well knows is existent; but, as usual,

when anything different from the old groove is introduced by way of improvement it must meet with great opposition before a trial is given. As regards the concluding suggestion of Captain Thomas, "that I should read a paper on jiggling at the Mining Institute of Cornwall," I quite agree with him. The subject is a very important one, and if time and place could be arranged with the scientific leaders of this noble institution I am quite prepared to offer a few remarks on the treatment of ores in general.

R. SOUTHEY.

Wheal Jane Mine, Sept. 17.

TREATMENT OF TIN ORES.

SIR,—I have read with much interest the letters from Captain Southey, Capt. Thomas, and "I. C. U." on this subject, and hope now it will have the consideration it merits. The former has very justly predicted that his ideas would give rise to a variety of opinions, and we find accordingly that the two latter do not agree with him, and for my own part I do not exactly agree with either of them. Capt. Southey's sweeping theory of passing all classes of ore through the stone-breaker without any previous hand separation, although a very good one for some classes of ore would prove disastrous where rich ore and debris happens to be mixed together, and as this is the case in the majority of tin mines where ores of all qualities happen to be mixed with debris more or less, I think he nor any other agent would not be foolish enough to go to the expense of crushing the whole together, which would evidently incur another expense in washing, and a certain loss of a portion of the ore. In every mine almost the ore varies very much in quality in different parts of the mine, and often some rich parts of the lode turns up which requires careful handling. But the bulk of the ore to be dealt with in Cornish mines is of a low grade, and so far I agree with Capt. Southey that there is a great deal of unnecessary labour spent on this class of ore, and that it would be a great saving to pass it direct through the stone-breaker. The system adhered to of hand breaking and picking is as old as Cornish mining, and although very valuable as the best living specimens of antiquity probably to be found throughout the civilised world, yet when compared to other modern systems appears a very laborious and expensive one.

The ore as it comes from underground is tipped on to a rough paving floor, and consist principally of rocks and stones, mixed with a small quantity of fine muddy ore, which very naturally besmears the rocks, so that it is impossible to distinguish ore from debris. A band of females, assisted by a few men armed with hammers, are then put to break it all down to the size of road metal about, and to pick out any poor stones they may happen to see. Now, it is evident enough in doing it this way that it is only the fractured surfaces of stones which are exposed to view, and it very often happens that the fractured surface shows a poor face, and the stone is thrown out to the waste heap, but a few drops of rain quickly show that it is a rich stone of ore, and if the manager happens to be passing at the time and picks it up the captain dresser gets a blowing up, and then the workpeople in turn get a threat of discharge. Many a poor captain dresser has been turned out of his bread in this way. Then, again, it often happens when a stone is broken that it is difficult to judge by the naked eye whether it contains tin or not, and we often see the workpeople turning them over in their hands, hesitating which way to throw them, and ultimately hand it to the captain dresser, who in turn is also puzzled; he washes it, and finds that it was either broken in the worst or best place. Then there are the rocks of debris, which must be broken before they can be detected, because, as I have just said, they are so bedaubed that they cannot be distinguished from the ore. Now, it is evident enough if the ore was tipped on screens, so as to separate the rocks from the smalls in its fall from the wagon to the floor, and then wash the rocks with a hose-pipe and rose to the end of it, such as is used for watering gardens, &c., it would greatly facilitate the work. Now, respecting the rough pavement, all this rough, stoney ore has to be shovelled into wagons to be sent to the stamps, and everyone who has tried the experiment must certainly know that to perform this 'on a rough pavement is a very painful and expensive job, and that if an iron plate was put under the ore instead of the rough pavement one man could do as much work as four.

On the Continent a great deal has been done to economise this labour, and where hand picking is found necessary a set of screens are used to class the rocks, stones, and small as they fall from the wagon. The rocks are by this means brought out near the mouth of the stone-breaker, there washed, the best ore collected, debris thrown out, and the dredge fed into the stone-breaker by hand. The stones are caught in a hopper provided with an inclined bottom and a door, and fed into a washing machine by merely lifting the door, which discharges on to a round revolving table, around which the pickers are placed; by this means the ore is constantly but slowly passing under their eyes in a clean state, so that the work is very much facilitated, and the girls are relieved from the laborious task of cracking the stones to see their value. The smalls fall down into a similar hopper, and may be run into wagons by simply lifting the door, and passed to the stamps or jiggers as required, or may be washed away to either by a stream of water.

This is the most economical way of handling the stuff when picking is advantageous. But the question in Cornish tin mining is where to draw the line—that is to say, what quality ore should be treated by this process, and which quality should be passed direct through the stone-breaker. This is a great question, and worthy the attention of the Mining Institute, and can only be settled by a series of experiments carried out in a scientific manner, so as to show the loss of tin incurred, and compare it to the saving in labour. We should then be approaching something like accuracy, and something far more satisfactory than the mere sounding of so many professional trumpets.

Now, as regards the difference of opinions in jiggling and buddling, I believe everyone who has had experience in using the jigger are convinced that it is a far more effective separator than the buddle, but has not up to the present been successfully employed in jiggling fine sand. The attempt has been made over and over again in Germany, where the machine was invented, but, practically, difficulties have arisen which caused its abandonment.

Capt. Southey informs the public now that he has solved this difficulty, and has every confidence in its success, and I hope it will turn out in practice equal to his expectations; but in expressing his preference of it over the round buddle I think he does himself a great injustice in saying it (the round buddle) is the worst invention ever made, as it would not be a great feat after all to supersede such a worthless apparatus. The fact of its being in use throughout the world where wet dressing is carried on is sufficient to prove that it has been of great service, but it does not follow, as Captain Thomas predicts, that it will outlive the jigger, which will certainly, if found to answer for this class of work, do it 75 per cent. cheaper than the round buddle. Should it not be found to answer there are other machines equally as efficient which have not yet been tried in Cornwall, and for my own part I believe the round buddle has nearly lived its day, and that we are about to see a great revolution in Cornish tin dressing. Though it will naturally meet with great opposition, Capt. Thomas's suggestion to have the matter discussed before the Mining Institute is very good as far as it goes, but if it is to end there, and not result in being backed by experiments, very little good will come out of it. Prejudice excited by professional interest is not to be overcome by mere talking and writing, but will only aggravate the difference already existing.

That there is a great difficulty in catching all the fine tin by the present mode of dressing is evident enough from the quantity of frames it passes over in the mines and on the Red River. And it is a very remarkable fact that the last stream works down the Red River of any importance, or the one that works the refuse from nearly all the others, collects the most tin. I had the pleasure a short time ago of visiting these works, and the only reason I can give for it is that it is the best laid out and the best managed works on the river, which combined with the fact that they make every effort to procure clear water, would almost lead one to conclude that more tin would be caught in the mines if more attention was given to these items, as it is a well known fact, and admitted by all tin dressers, that clear water is the best known means of preventing the tin escaping.

It would seem an easy matter to procure clean water in Cornwall,

where the rainfall is 4 ft. per annum. Moreover, it is easy in each case to let the water settle and pump it back again before it leaves the mine. This difficulty of collecting the fine tin will be better understood when we consider that fine gold, which is much heavier than tin, cannot be effectually collected without the aid of quicksilver, and at the same time lead one to desire a similar means of arresting it. Meanwhile every known means should be used for preventing its escape. What I have said above respecting the jigger and other apparatus, however effective they may be, cannot affect the treatment of slime ores, nor prevent in the least the escape of the fine tin.

They will separate the tin from all sandy matter automatically, but will not separate the tin from pulverised matter, which is by far the most difficult part of tin dressing. We are, therefore, very much in want of a good slime-dressing machine. Capt. Thomas says from one-eighth to one-sixth of the tin escapes in the water; this must be a very serious matter, and worthy of the strictest investigation, and should lead every one interested to consider how it can be prevented. We all know well enough how the tin becomes pulverised, but under the present system of dressing cannot very well prevent it, but I have no doubt it would be prevented to a certain extent if more grate way was provided for the stamps. The ore is confined so long under the heads that a great many of the coarse grains of tin become pulverised, and then float away to the river, and probably to the sea. It is, therefore, highly important to allow the ore to escape from under the heads as quickly as possible, although it could not even then possibly prevent the pulverising of some of the coarse grains, which naturally leads one to desire that the metal could be obtained without stamping, or that some better means could be adopted, but as all crushing mills have the same defect we can scarcely expect from the nature of the work to see it remedied in them. It is, however, very gratifying to see that a new smelting process has just been invented by Mr. Holway, by which all sulphurous ores can be smelted without fuel, only requiring a little to ignite the furnace, after which the necessary heat is maintained by the combustion of the ore, and the whole of the sulphur is utilised. The sulphides require to be mixed with a certain amount of silicious matter, so that it would appear that it is well adapted to treat some of the sulphurous tin ores of some of the Cornish tin mines where it is desirable to utilise the sulphur.

It is to be hoped then, to a certain extent, if not altogether, that this ingenious invention has solved the difficulty, and must also tend greatly to stimulate the hope that science will ere long relieve us altogether from this wasteful and vexatious process which consigns so much of the valuable produce to the sea.

W. NANCE.

Stanley-street West, North Shields, Sept. 17.

SILVER-TIN PLATING.

SIR,—It not unfrequently happens that inventions which do not proceed to a patent are quite as suggestive as those which do, and this is, probably, the case with the silver-tin electro-plating process, for which a patent was applied for (but never completed owing to the necessary formalities not having been complied with) on behalf of Edwin Round and Son (Limited), of Sheffield. The object in view is to coat brass, German silver, nickel, copper, and (if slightly covered with a film of copper) iron and steel with an alloy of silver and tin. This white reguline deposit is thrown down from an alkaline solution, is easily polished, and greatly resembles native silver. It is proposed to dissolve 80 ozs. of commercial cyanide of potassium in 20 gallons of water in a suitable vessel; then pour in 100 ozs. by measure of strong liquid ammonia of the specific gravity of 880, stirring well together. Next add 10 ozs. of nitrate of silver—any soluble tin salts may be added at discretion; then add 3 lbs. of carbonate of potassa; let the whole compound stand until all sediment has subsided, then carefully decant, and the solution is ready for use with the addition of a large anode of tin and a smaller anode of silver. The particles to be plated by this process are well cleansed in caustic ley, all oxide being carefully removed. They are then immersed in the prepared solution and connected with the negative pole of a strong electric battery, the two anodes of metal being connected with the positive pole of the battery, and allowed to remain until the required thickness of deposit is obtained. They are then removed, washed and dried, and may be polished or burnished to a high degree, closely resembling unalloyed silver, and can be produced at a far less cost than at present.

Now, it is certainly worthy of consideration whether the metal here thrown down is really an alloy of silver and tin, or whether it is merely silver—a fact which could be readily ascertained by analysis. If it be proved that it really is an alloy the importance to the producers of tin can scarcely be over-estimated, for it will permit of the introduction of an entirely new class of ornamentation, which would be particularly applicable to furniture decoration and the embellishment of much of the metal work at present used in the house. I believe that Cornishmen will only require to have their attention directed to this matter to induce them to exert themselves to the utmost to secure an increased demand for the metal by encouraging the use of—

SILVER-TIN.

Sept. 16.

THE MINING INTERESTS.

SIR,—That the spirit of enterprise is awakened all connected with commercial pursuits, and especially with mining, well know, while the salutary and healthy influences of past prostration and prolonged inactivity have cleared the atmosphere of a heap of schemes and projects that afford the judicious investor a selection of properties at greatly reduced prices rarely afforded during the present decade. The great industry of this country is iron, which in its varied application acts upon almost every other description of employment throughout the length and breadth of the land. We need only to mention railways, machinery, shipping, building, telegraphy, gas and water pipes, and appliances with nails, locks, cutlery, and a thousand other applications to prove that the metal is universally used and intimately interwoven with the social and material prosperity of every kind of industry, and the requirements of every member of the community. It is, therefore, with hope and confidence in the future that we learn of increased activity and increasing consumption of this metal. America is our first and important customer, the requirements of the United States are represented as something astounding, while the impetus given to railway construction somewhat resembles the furor existing in England during the period extending over 1839 to 1845. Coal, again, is required in increased quantities, and there is a hopeful tone prevailing in most of our large producing districts. There is apparently only one drawback to the prosperous expansion of the iron and coal trades, and that is the growing discontent of miners and workpeople. These deluded people are not satisfied with the havoc and ruin inflicted on masters during the past five years; but, on the contrary, at the first favourable movement they apply for increased wages, and threaten to organise strikes if refused. They should remember that ironmasters and coalowners are not yet out of the wood, or nigh clear of their accumulated obligations, and to press them hard at the first spurt is simply to add to the long list of past embarrassments, if not also of bankrupts. Copper is firm, although stationary in price. Tin has advanced 20s. a ton from the lowest point of depression. Spelter is 19s. a ton—a very important improvement. Lead is also advanced from the minimum quotation some 2s. to 3s. a ton.

The tin mines more especially benefited by recently advanced standards are Wheal Peavor, South Condurrow, Dolcoath, Tincroft, Carn Brea, and Wheal Agar.

That the discovery of a large deposit of copper ore has been pierced at Wheal Crebor at the 108 and 120 fm. levels is an established fact, as also that some thousands of tons will be brought to market, is too evident to be doubted. Authorities, however, are divided as to the nature and character of the deposit, some alleging that it is a distinct lode standing whole throughout the length of the sett, while others are equally certain that it is the old lode divided by a wedge or horse of killas, and that its length both east and west is determined. At all events at the bottom of the winze at the 108, and down to the 120 fm. levels, the yield is variously estimated at 25 to 30, up to 35 tons of copper ore per fathom, the lode being 16 ft. to 20 ft. wide, and worth upwards of 100s. a fathom. The company's

concession is adjacent to the Devon Great Consols, which advanced to tenfold the market value of Crebor, and declared in dividends over twentyfold, Crebor being in 6000 shares, and selling at 8½ and 8¾ each. Bedford United is in the same district, and shares are in request at 8s. 6d. and 9s. 6d. This property is worth watching, as an advance in price of ore, or a very moderate increase in yield, will admit of the resumption of dividends. Again, East Caradon is attracting attention. There is a cross-cut being driven to intersect one of South Caradon rich lodes. The shares are now to be had low, and it should be remembered that a discovery some years ago rendered the shares from 2s. 6d. worth 58½ each. South Frances looks well, and profits are likely to augment. Bwlch United is about to adopt boring machinery, and thus lay open the lodes more rapidly; hence the future promises increased yield without corresponding expenditure. Bodidris continues to improve in driving eastward from shaft on new lode, the leader of lead being now 8 in. wide, yielding 2 to 3 tons of lead to the fathom, large rocks of 50 to 70 lbs. weight being raised, and to be seen at the pit's mouth. This is a point of importance. In conclusion, it is evident from the interest enlisted in Crebor that the public fully estimate discoveries of mineral wealth whenever made in paying quantities, whether in lead, copper, or tin mines, as for example, Devon Great Consols, East Caradon, Great Alfred, Van, Alfred Consols, Trelawny, Great Laxey, Mary Ann, with Dolcoath, Tincroft, South Condurrow, and though last not least Wheal Pevor, all of which were marked market mines, and in their career attained to a pitch of recognition that repaid investors and speculators who embarked in time.

R. TREDINNICK,
Dealer in Stocks and Shares.

38, Cornhill, Sept. 17.

THE EFFECTS OF THE LOW PRICE OF METALS.

SIR,—In the parish of Crowan there were some years ago numerous mines at work simultaneously, at the present time there is not a miner at work in the parish. In Breage, where thousands were formerly employed, in Wheal Vor, Great Work, Godolphin, and other mines, I believe there are not a dozen miners at work. In Wendron, the best tin district in Cornwall, where in Trumpet Consols, Lovell, East Lovell, and numerous other mines, hundreds of miners were employed, there are very few men engaged. In this parish there is a little tin mine called South Wendron, employing about 20 men. There are very few, if any, employed besides.

In Gwennap, once the busiest district in Cornwall, there are a few men employed in Cornford and Penstruthal Mines, and perhaps two or three in Bell Vein Mine; every other mine is idle, I believe.

St. Ives, another tin district, contains numerous mines, all idle. St. Ives Consols, Providence, Wheal Margery, Trenwith, &c., formerly employed many hundreds of men, and gave large profits.

In Lelant, Wheal Sisters is, I believe, the only mine at work. In St. Erth there is a dead silence throughout. The same in Phillack, where Alfred Consols, Wheal Alfred, &c., are situated—formerly rich mines. The same may be said of Gwinear, where numerous mines were at work 20 years ago. It is not quite so bad at St. Agnes, where Penhalls, Wheal Kitty, and Blue Hills are at work, but many more are idle.

In Perranzabuloe there is one mine at work—West Chiverton, and a few men at East Chiverton. In Newlyn, I believe, there are none. East Wheal Rose is here, once a very rich lead mine, the profits in which induced the setting on of about 20 or 30 others. It is a lead district, like Perran. In Kenwyn no mine. In Kea one—Wheal Jane, which has been sustained by the superior management of Captain Southey. In Calstock one—Gunnislake (Clitters). In St. Cleer there are a few remaining at work, but several abandoned. In St. Just nearly three-fourths of the mines are abandoned.

In Redruth there are four—Wheal Pevor, West Pevor, Wheal Uny, and Wheal Prussia; but there were formerly many more, including Pedn-an-drea, Sperron, Clijah and Wentworth, Trefus, Wheal Cupid, North Downs, Great North Downs, Tolgus, South Tolgus, Great South Tolgus, and several besides.

Camborne and Illogan are the chief mining parishes in Cornwall at the present time. Now that tin is advancing it may be expected that some of the abandoned works will be resumed before another year expires.—Sept. 13.

MINING IN LLANARMON.

SIR,—I searched with a considerable degree of interest for the important statistical information (named in the Journal of Sept. 6) in the Journal of Sept. 13, but without success, which should have been contributed by your North Wales Correspondent. His notes in the Journal of Sept. 13 were instead of a meagre character and far from being reliable, because of his doubtful manner of expression, his sentences having too many words such as "might," "it is supposed," "rumoured," &c. I have to complain this week of your North Wales Correspondent, but not in a bad spirit, or with any hostile feeling, of his rather misrepresenting my meaning in my letter of Sept. 6 on the way in which intending investors should obtain information for themselves before they invest money in lead mines; and I said I thought the practical way to do so was to make enquiries from those in authority, and the investors would then be able to judge for themselves of "the value" of the information thus obtained; and I feel sure that no one could interpret what I then said from the words used—"that mine managers" needed no instruction from "field lecturers." In the absence of any "practical" suggestions or schemes for carrying out these "field lectures" by your North Wales Correspondent, I am afraid all who wish to be "practical" in their investments will have to fall back upon the "mine managers," so ungenerously "hit" by your North Wales Correspondent in his letter in the Journal of Sept. 13. I think the "mine managers" and agents in Llanarmon district are particularly well able, nevertheless, to give a substantial reason for the faith that is in them as respects mining—take, for example, the answer of Capt. J. A. Ede, in last Saturday's Journal, to the questions propounded by your North Wales Correspondent in the Journal of Aug. 30. I know it is many times much easier to ask questions than to answer them, else I should most likely have had a complete reply from your North Wales Correspondent to all the questions I put to him upon his suggested "field" or "open air lectures," instead of which, I am told, so and so "might" be done. If your North Wales Correspondent will make a personal visit to Llanarmon district and make his own enquiries, he will, I feel sure, after doing so do his best to aid the efforts now being legitimately made to bring them to a successful issue. He may rest assured that in spite of any back-handed taps the present works, and more, will go on in the Llanarmon district, and it will not be pleasant, I am sure, for him to have the laugh turned against him in the future when his present seemingly depreciative remarks are remembered against him. He could not answer my question which I put in the Journal of Sept. 6. I will now give him some of the results of my enquiries—names for obvious reasons not being mentioned:—

1.—Capital per shareholder (total) invested, 8½; dividend returned, 700½. Authority for my statement—Receiver.

2.—200½ invested by discoverer in making a great discovery. Discoverer was offered 8000½ in cash and 7000½ in shares for his interest. Wanted 10,000½ in cash and 5000½ in shares. Negotiation broken off.—Authority: One of the negotiators.—I was myself on the property not 18 months since, and the owner himself told me that month he would clear over 500½.

3.—Single individual invested 200½ or 300½ in a property in Llanarmon district. Cleared 9000½ by working it.—Authority: Gentleman himself; present living.

4.—70 yards of vein (lineal measure on surface) paid 70,000½ royalty to landowner, and immense wealth to shareholders.—Authority: A reliable M. and C.E.

5.—Many progressive mines at present working; proved; valuable lodes; one instance of less than 30 acres of ground with five known good lodes running through, one of which at a low estimate may be put down as worth 20,000½; cost to obtain this result under 500½. Others working in the neighbourhood with good results at equally small outlay.

I do not think it necessary at present to multiply cases; but I think with Capt. Ede, when the present and past sluggishness in the mining world is changed into activity and briskness, we may expect to see the "little hills" of Llanarmon "skip like rams," and the mountains

resound with the joys of an awakened, active, remunerative, healthful, commercial life, when the landowners will receive the benefit of invested capital, and when that capital will revivify the whole district with an energy and strength that will not only "astonish the natives," but most likely the whole of North Wales.

Lancashire, Sept. 15.

P.S.—I should very much like your North Wales Correspondent to elaborate a scheme for "field" or "open air lectures on mining," and insert it in the Journal at his earliest convenience.

CAKEMORE, CAUSEWAY GREEN, AND LOWER HOLT UNITED BRICKWORKS AND COLLIERY COMPANY.

SIR,—Will you kindly allow me to supplement the information contained in the notice of this company, in last week's Journal, with a few actual figures as to the results? I find that since we started our new brick machinery in August of last year we have made upwards of 5,000,000 bricks, and this in spite of the fact that during the greater portion of that period the machinery was only partially in operation, its completion, in fact, having occupied up to within the last fortnight. Since then the result of the completion has made itself felt by the increased make, we having in seven consecutive working days made 236,800 bricks, nearly all blue, besides putting out 1082 tons of coal from the colliery, and we confidently expect that our make of bricks for next year will be 10,000,000. All this make has been sold as rapidly as turned out, so much so that on taking stock on Aug. 31 we had barely two weeks' make on hand, while there were orders on the books for more than that number; indeed, the quality of the bricks is such that they sell themselves.

London, Sept. 17.

A. W. SNELLING, Sec.

CAKEMORE, CAUSEWAY GREEN, AND LOWER HOLT UNITED BRICKWORKS AND COLLIERY COMPANY.

SIR,—The description given in last week's Journal of the Cakemore, &c., Brickworks and Colliery sounds wonderfully promising, but what would interest me much more is the announcement of another dividend. The 7½ per cent. I received in my last has only whetted my appetite, and hearing some rumour of another one being paid *ad interim*, I have been anxiously waiting for a repetition of the dose. In these days of general financial ailment, physic of that kind cannot be too often administered, and if the concern is doing such a flourishing trade I think the directors might divide some of the moneys they must be accumulating. Perhaps if you kindly insert this in your next number it may elicit some information on this point, which is the all-important one to—

London, Sept. 17.

A SHAREHOLDER.

CROWN MINERAL RIGHTS.

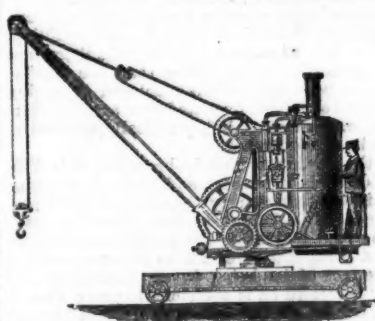
The following letter, which appeared in our evening contemporary the Echo, relates to what has long been a grievance with mining adventurers. The practices of the Commissioners of Woods and Forests in letting Crown mineral lands must be altered; and looking at the large tracts of lands under their management, and the comparatively small returns, it might be well for some independent Member of Parliament next session to move for a Commission of Enquiry into the method of conducting this large estate. If Mr. David Davies could be induced to take the matter up his vast experience would be of great advantage:—

SIR,—Will you allow me, through your columns, to point out how little may be expected from the Government to facilitate mineral research? It may not be known generally that the Crown is in possession of very extensive mineral rights all over the United Kingdom, which are under the control of the Commissioners of Woods and Forests, the principal of whom is the Hon. James Howard. Terms upon which this gentleman will permit searches for minerals to be made on Crown lands are such as no other landed proprietor in the United Kingdom ever demanded, and are such as effectually preclude either a poor man or a capitalist from taking up mineral grants on Crown lands. They are briefly as follows:—

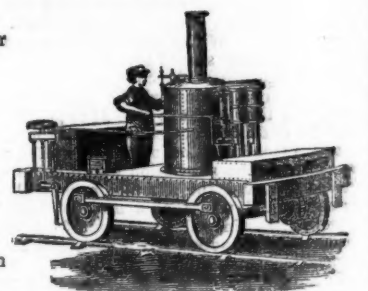
- 1.—The payment of a fee for the taknote, or licence.
 - 2.—The payment of a certain sum in advance, as dead rent.
 - 3.—The reservation of an *unvarying* royalty of one-twelfth.
 - 4.—(I copy this from one of my own leases, and it is one of the most monstrous clauses ever imposed, reducing the Crown to the position of a mining speculator.) And that if and so often as the said leases, their executors, &c., shall receive or become entitled to any sum of money or other consideration for or in relation to any under-lease, assignment or any agreement or other disposition, then and in every such case they shall pay to the Queen's Majesty, her heirs, &c., one-fourth part of such sum of money or of the value of such other consideration as aforesaid. And that where any such consideration as above-said, or any part thereof, shall consist of any stock, shares, or other interest in any company or partnership, then the estimated value of such stock, &c., shall be taken to be the nominal amount thereof, and as if the same were already fully paid up.
- Thus, if I sell my mineral interest to a company, taking the whole of the purchase-consideration in fully-paid-up shares—say, for argument sake, it is 1000½.—I must pay the Crown 250½ in cash, whether my shares really ever become worth a shilling or not. Comment on this is needless. As a matter of fact there are, to my own knowledge, thousands of acres of valuable Crown mineral rights, as well as partially developed mines, lying idle and unwrought owing to these most unfair conditions. Surely at a time when the country is suffering from extreme depression, and so many miners are out of employment and emigrating, the representatives of the Crown ought to be the last to impose impracticable conditions on home industries already suffering severely from many causes. I, therefore, ask the advocacy of your columns to induce the Office of Woods and Forests to alter their conditions to the usual terms of large landholders:—
- 1.—The granting of a licence for a fixed and moderate charge.
 - 2.—Without dead rent for the first year.

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PRIZE MEDAL, INTERNATIONAL EXHIBITION.



STEAM CRANES,
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To hoist 15 cwt. to 30 tons.



LOCOMOTIVES,
6 to 27-horse power. For Steep Inclines and Sharp Curves.
Gauge from 2 feet upwards.
Geared to draw very heavy weights in proportion to their power, and SPECIALLY
SUITABLE FOR

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These Cranes were selected by H.M. Commissioners to receive and send away the Heavy Machinery in the International Exhibitions 1862, 1871, and 1872.

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NOW APPLIED TO OVER



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ATTERCLIFFE, SHEFFIELD,

DEVOTE THEIR EXCLUSIVE ATTENTION TO THE MANUFACTURE OF

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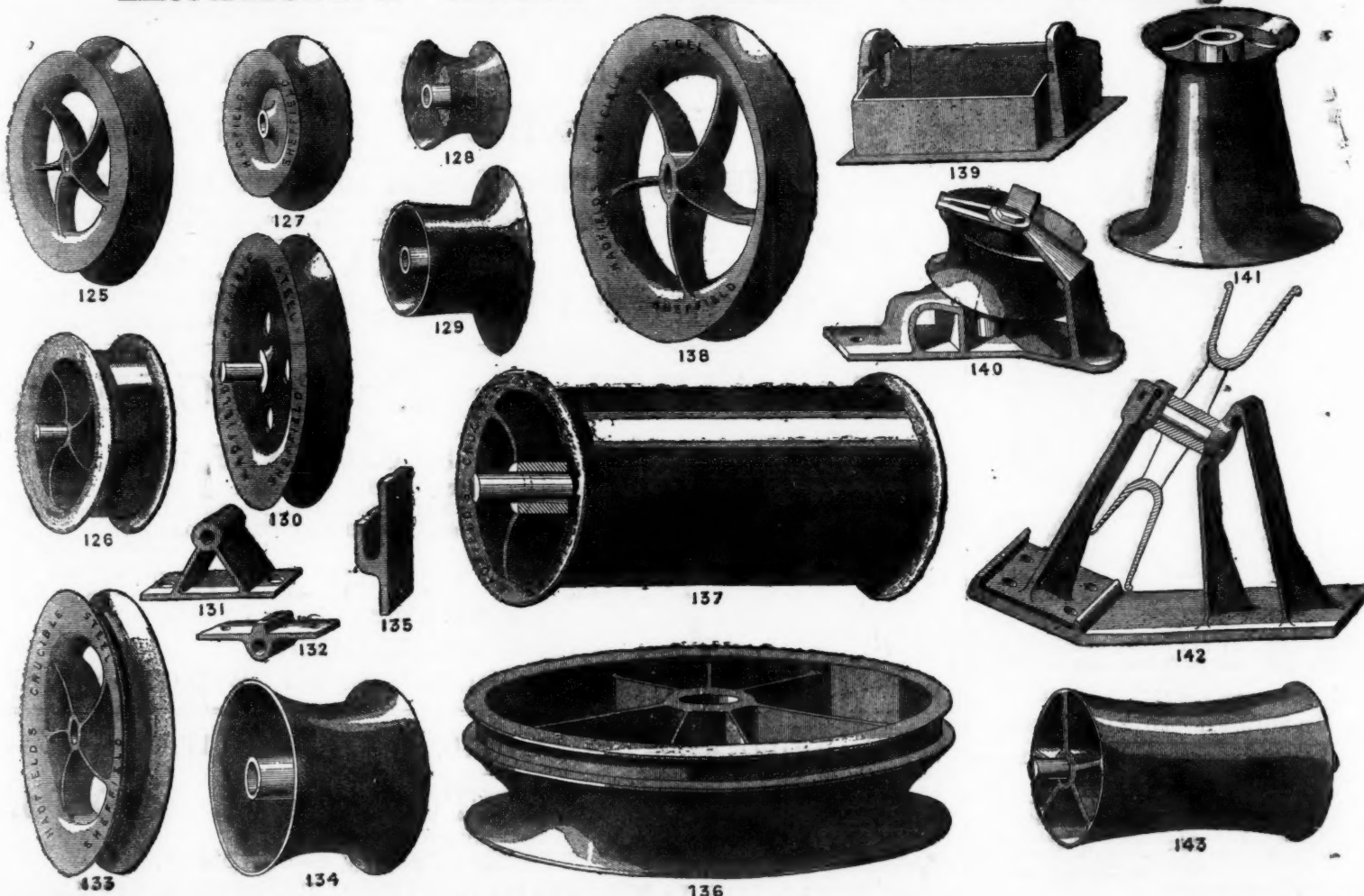
FOR

Engineering & Mining Purposes,

AND ARE THE SOLE MAKERS OF



Hadfield's Steel Rollers and Pulleys.



This Advertisement is varied from time to time.

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3.—STRENGTH.—Although extremely light they cannot be broken by ordinary means—say by the sudden passing of chains over them such as frequently connect the rope to the wagon, or hang loose from the end of the passing wagons.
4.—DURABILITY.—One of our Crucible Steel Rollers or Pulleys will outlast about TWELVE IRON ONES.
5.—They reduce wear and tear to a minimum, and are a great saving in working expenses.

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FOR MY LATEST PATENTED STONE BREAKERS AND ORE CRUSHERS.
Stones broken equal, and Ores better, than by hand, at one-tenth the cost.

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New Patent Reversible Jaws,
in Sections, with Patent
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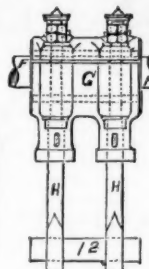
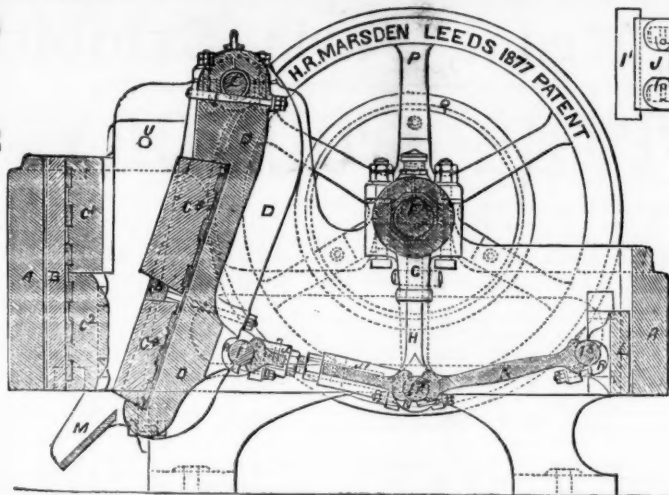
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NEW PATENT STEEL TOGGLE BEARINGS.

70

PRIZE MEDALS.



READ THIS—

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November 7, 1878.
H. E. MARSDEN, Esq., Soho Foundry, Meadow-lane, Leeds.
DEAR SIR,—The machine I have in use is one of the large
size, 24 in. by 12 in. The quantity we are breaking daily with
this one machine is 250 tons, the jaw being set to break to a
size of 2½ in. We have, however, frequently broken over
300 tons per day of ten hours, and on several occasions over
360 tons during the same period. The stone we break is the
blue mountain limestone, and is used as a flux in the various
ironworks in this district. We have now had this machine in
daily use for over two years without repairs of any kind, and
have never had occasion to complain of any inconvenience in
using the machine. I hope the one you are now making for
me may do its work equally well. The cost—including EX-
GINE-POWER, COALS, ENGINEMAN, FEEDING, and all EXPENSES
OF EVERY KIND—is just 3d. per ton. Should any of your
friends feel desirous of seeing one of your machines at work,
I shall have much pleasure in showing the one alluded to.
I am, dear Sir, yours very truly,
WILLIAM MILLER.

AND THIS—

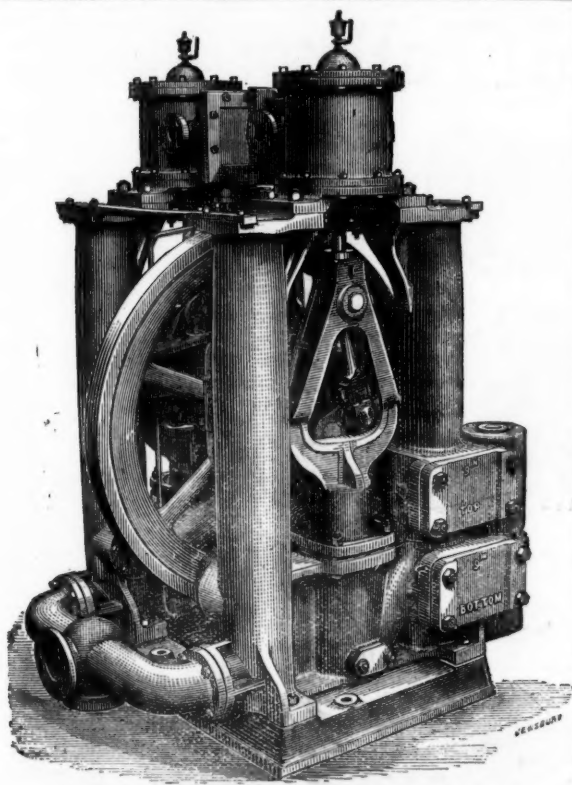
Wharholme Lime Works, Aspatria, Cumberland,
July 11th, 1878.
H. R. MARSDEN, Esq., Soho Foundry, Leeds.
DEAR SIR,—We are in receipt of your letter of 4th inst. I
may just state that the stone breaker above named has been
under my personal superintendence since its erection, and I
have no hesitation in saying that it is as good now as it was
five years ago.
I am, dear Sir, yours faithfully,
FRANCIS GOULD.

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ALL BEARINGS are renewable, and made of H.R.M.'s Patent Compound ANTIFRICTION METAL.

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